

CARE OF YOUR NEW ELECTRONIC CALCULATOR

The calculator is a durable, precision-made instrument which will provide you with years of trouble-free service. To help ensure this we recommend that the inside of the calculator not be touched. It is also inadvisable to subject the calculator to hard knocks, drops, and unduly strong key pressing. Extreme cold (below 32° F or 0° C), heat (above 104° F or 40° C) and humidity may also effect the function of the calculator. When you do not use the calculator for a long period, take out the batteries to prevent damage if the batteries leak. Special care should be taken not to leave the dead batteries inside the calculator. Please make sure you switch off the power when you finish your calculations or intend to open the cover to change batteries. Should the calculator need service, take the unit to the store where purchased or to a nearby dealer.

CASIO®

Printed in Japan



ELECTRONIC CALCULATOR **CASIO AL-8** INSTRUCTION MANUAL



INTRODUCTION

Dear Customer,

Congratulations on your purchase of this superb little electronic calculator with all the basic and some very special calculating abilities. This high precision electronic calculator will serve you well for years if properly looked after. To handle the calculators many abilities is relatively easy but we suggest you spend a few minutes with this instruction manual if you want to make full use of its versatile features.

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1/KEYBOARD

POWER SWITCH:

Move the left-side switch forward to start a calculation.

READ-OUT **O.**:

Shows each entry and result through a Digitron tube panel, suppressing unnecessary 0's (zeroes).

The fraction and time in sexagesimal scale are displayed with the symbols ("**↓**" and "**□**") respectively as follows.

[Example] $45\frac{12}{23}$ is displayed: **45↓12↓23.**

63 hours 52 minutes 41 seconds is displayed: **63□52□41.**

NUMERAL/DECIMAL POINT KEY **0 ~ 9, .**:

Enters numerals. For decimal places use the **.** key in its logical sequence.

FUNCTION COMMAND/RESULT KEYS **+, -, ×, ÷, =**:

Press the numeral and function command keys in the same logical sequence as the formula and the **=** key obtains the answer. To correct a function command, depress the appropriate key (**+, -, ×, or ÷**).

MEMORY PLUS (MINUS) KEY $M+$ ($M-$):

Transfers the number displayed to the memory positively (negatively). Obtains answers in four functions and automatically accumulates them into the memory positively (negatively).

MEMORY RECALL KEY MR :

Recalls contents of the memory without clearing the same.

MEMORY CLEAR KEY MC :

Clears the contents of the memory.

NOTE: When the function mode selector mentioned below is set at the "SD(σ)" position, the $M+$, $M-$, MR & MC keys obtain the arithmetical mean, number of data, the sum of square and the sum respectively in statistical calculations.

PERCENT KEY $\%$:

Performs percentage calculations including mark-ups/discounts.

CLEAR KEY C :

Clears entry for correction. When depressed after function commands, it clears entire machine except the memory.

ALL CLEAR KEY AC :

Clears entire machine except the independent memory, and also releases overflow check.

②

DECIMAL MODE SELECTOR F CUT $5/4$:

At the "F" position, the decimal floats and the underflow system works to protect the significant digits.

At the "CUT" position, an answer is automatically cut off at 2 decimal places, applying floating mode for entry and intermediate result.

At the "5/4" position, an answer is rounded off in a similar way to the above.

FUNCTION MODE SELECTOR $\sqrt{}$ GT rem $a\frac{b}{c}$ hms $SD(\sigma)$:

By setting the selector at the appropriate position, the F key performs the following operations:

At the " $\sqrt{}$ " position, it extracts the square root.

At the "GT" position, it recalls the total accumulated by the Σ key.

At the "rem" position, it obtains the remainder while the Σ key gives the integer answer in division.

At the " $a\frac{b}{c}$ " position, it performs fractional calculations and also converts the answer obtained as a fraction by the Σ key to the decimal scale.

At the "hms" position, it performs time calculations (or angle calculations) and also converts the answer obtained as a decimal by the Σ key to the sexagesimal scale.

③

At the "SD(σ)" position, it retrieves the standard deviation in statistical calculations.

PRE-PROGRAMMED FUNCTION KEY \blacksquare :

In combination with the function mode selector, it performs the above operations.

2/DISPOSABLE DRY BATTERY OR AC OPERATION

This calculator operates on either dry batteries or AC with the use of the AC adaptor.

DRY BATTERY OPERATION

With two AA size Manganese dry batteries (SUM-3) it operates for approximately 10 hours continuously.

A decrease in battery power is indicated by "0." recurring on the display, or when all except the first column figures grow dim. Batteries should at this time be renewed. When you have finished your calculation, be sure to switch off the power to save the battery.

To change batteries, put the power switch off first. Slide open the battery cover and replace batteries.

AC OPERATION

Use only an adaptor with the same voltage rating (110, 117, 220 or 240V) as your supply to prevent component damage. If in doubt, ask

your local dealer. Plug the AC adaptor into the AC outlet and the cord into the calculator, this automatically cuts off battery power supply.

* To prevent damage to the calculator, USE ONLY THE AC ADAPTOR recommended by your dealer.

3/OVERFLOW CHECK

Overflow is indicated by the "E." sign and stops further calculation. To release the locked registers caused by the overflow check, depress the **AC** key.

Overflow occurs:

- 1) In the "F" mode, when an answer, whether intermediate or final, or an accumulated total in the memory exceeds 8 digit integers (or 7 digits, when the figure is negative.).
- 2) In the "5/4" or "CUT" mode, when the integer part of a final answer or an accumulated total in the memory exceeds 6 digits (5 digits, when the figure is negative.).
- 3) When a fractional calculation is performed with the denominator of 0 (zero).
- 4) When either the **M+** or **M-** key is depressed while the function mode selector is set at " $a\frac{b}{c}$ " or "hms" position, or unlogical calculations are performed.

4/BASIC OPERATIONAL EXAMPLES

- * There is no need to depress the **AC** or **C** key prior to starting each new calculation.
- * It is necessary to set the function mode selector at the "√" position unless otherwise instructed.

EXAMPLE	OPERATION	READ-OUT
$741-258+963=1446$	"F" 741 - 258 + 963 =	1446.
$7894 \div 6=1315.6666$	"F" "CUT" "5/4"	7894 ÷ 6 = 1315.6666 7894 ÷ 6 = 1315.66 7894 ÷ 6 = 1315.67

* A negative figure is indicated by a minus sign on the left of the figure.

$$(12+3-45.6) \times 89 \div 7 \quad "F" \quad 12 **+** 3 **-** 45 **÷** 6 **×** 89 **÷** 7 **=** -389.0571$$

Note: To perform a problem commencing with a negative figure, operate **ENTRY** in sequence.

⑥

EXAMPLE	OPERATION	READ-OUT
$(-2.6) \times 7=-18.2$	"F" ENTRY 2 ENTRY 6 × 7 =	-18.2
$2 \times (-3) \div (-8)=0.75$	"F" ENTRY 2 × 3 ÷ 8 =	0.75

5/MULTIPLICATION/DIVISION WITH A CONSTANT

ENTRY **×** **×** (**ENTRY**) ENTRY **=** Obtains product (quotient).
ENTRY **=** Obtains product (quotient).

→ Number entered is set as a constant multiplier (divisor).

* To renew the constant, follow the same operation steps as above.

* The constant is released when normal calculating is performed.

EXAMPLE	OPERATION	READ-OUT
(K)		
2.3 $\times 12=27.6$	"F" 12 × 2 × 3 =	27.6
9 $\times 12=108$	9 =	108.
4.56 $\times 12=54.72$	4 × 56 =	54.72

EXAMPLE	OPERATION	READ-OUT
(K) $74 \div 2.5 = 29.6$	"F" 2 0 5 ÷ 74 =	29.6
$85.2 \div 2.5 = 34.08$	85 0 2 ÷	34.08
$6 \div 2.5 = 2.4$	6 ÷	2.4
(K) $3 \times 6 \times 4 = 72$	"F" 3 × 6 × 4 =	72
$3 \times 6 \times 5 = 90$	5 =	90
$3 \times 6 \times 6 = 108$	6 =	108

* Square/powers and reciprocals are performed as follows.

EXAMPLE	OPERATION	READ-OUT
$1.7^2 = 2.89$	"F" 1 0 7 × × =	2.89
$1.7^3 = 4.913$	=	4.913
$1.7^4 = 8.3521$	=	8.3521
$\frac{1}{4} = 0.25$	"F" 4 ÷ ÷ =	1.
$\frac{1}{4^2} = 0.0625$	=	0.25
		0.0625

(8)

EXAMPLE	OPERATION	READ-OUT
$\frac{26}{12+45} = 0.4561403$	"5/4" 12 + 45 ÷ 26 =	0.4561403

6/PERCENTAGE CALCULATION

The **%** key performs percentage calculations with $\times \div$ operations. Depressing **+** or **-** immediately after the **%** key gives a mark-up or discount.

EXAMPLE	OPERATION	READ-OUT
6% of 7530	451.8 "F" 7530 × 6 %	451.8
Percentage of 789 against 1230	64.15 "5/4" 789 ÷ 1230 %	64.15
* A constant is also utilized in percentage calculations.		
15% mark-up of 1600 . . .	1840 "F" 1600 × 15 % +	1840
25% discount of 7890 . . .	5917.5 "F" 7890 × 25 % -	5917.5

7/MEMORY CALCULATION

MC ENTRY \times (,+,=) ENTRY \square (MR) . . . Obtains an answer and automatically accumulates it into the memory positively (negatively).

ENTRY \times (,+,=) ENTRY \square (MR) . . . Obtains an answer and automatically accumulates it into the memory positively (negatively).

MR . . . Recalls the accumulated total in the memory without clearing the same.

→ Clears contents of the memory.

* Be sure to depress the **MC** key prior to starting a memory calculation.

EXAMPLE **OPERATION** **READ-OUT**

$53 \times 21 = 1113$	"F"	$\square 53 \times 21 \square$	1113.
$+ 46 \times 37 = 1702$		$46 \times 37 \square$	1702.
2815		MR	2815.
$70 + 40 + 100 = 210$	"F"	$\square 70 + 40 + 100 \square$	210.
$- 80 - 5 + 20 = 95$		$80 \square 5 \square 20 \square$	95.
115		MR	115.

(10)

EXAMPLE

EXAMPLE	OPERATION	READ-OUT
$456 \div 1.2 = 380$	"F"	$\square 456 \div 1.2 \square$
$+ 4578 \div 1.2 = 3815$		$4578 \square$
4195		MR
$\frac{85+26}{43-18} = 4.44$	"F"	$\square 85+26 \square$
		$43-18 \square$
		25.
		$85 \square 26 \square$
		4.44.
Note: The M+ (M-) key also works to transfer a number displayed, whether entry or result, to the memory positively (negatively) as many times as the M+ or M- key is depressed.		
$7+7-7+(2 \times 3)+(2 \times 3) = 19$	$\square 7 \square 7 \square 7 \square 2 \times 3 \square 2 \times 3 \square$	19.

8/CALCULATIONS USING THE **F** KEY

This calculator enables you to perform various kinds of practical calculations by using the **F** key in combination with the function mode selector.

NOTE: PLEASE STICK THE LABEL ENCLOSED TO THE BACK OF THE CALCULATOR FOR YOUR REFERENCE.

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8-1 Square root calculation

With the function mode selector at the “ $\sqrt{}$ ” position, the **F** key extracts the square root of the number displayed up to 8 digits, regardless of any decimal setting.

The minus sign (–) appears when a negative figure is extracted.

EXAMPLE	OPERATION	READ-OUT
$\sqrt{12} = 3.4641016\dots$	“ $\sqrt{}$ ” “F”	12 F 3.4641016
$(\sqrt{2} + \sqrt{3}) \div \sqrt{5}$ = 1.4070522	“ $\sqrt{}$ ” “F” 2 F + 3 F ÷ 5 F =	1.4070522

8-2 Automatic accumulation

With the function mode selector at the “GT” position, the **M** key transfers the number on display, whether entry or result, to the memory independent of the **MR**, **M+**, **M-** and **M** keys, and the **F** key recalls the contents of the memory.

Depress the **AC** key to clear the contents of the memory accumulated by the **M** key.

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EXAMPLE	OPERATION	READ-OUT
53+6=59	“GT” “F”	53 + 6 = 59
23-8= 15		23 - 8 = 15
56×2=112		56 × 2 = 112
+1 99÷4= 24.75		99 ÷ 4 = 24.75
		P 210.75
		210.75
2+3+4 = 9	“GT” “F”	2 + 3 + 4 = 9
5+6+7 = 18		5 + 6 + 7 = 18
+1 12+3.14=15.14		12 + 3.14 = 15.14
		P 42.14
42.14		42.14
7+8-9= 6		7 + 8 - 9 = 6
		P 65
65		65
+1 45×1.3 =58.5		45 × 1.3 = 58.5
		P 129.5
129.5		129.5
Grand total: 171.64		MR 171.64

8-3 Remainder in division

With the function mode selector at the “rem” position, the **F** key obtains the remainder while the **=** key delivers the integer answer for (1)

the quotient in division.

Even if the decimal mode selector is set either at the "5/4" or the "CUT" position, the quotient is always displayed in integer figures.

EXAMPLE	OPERATION	READ-OUT
$123 \div 7 = 17$ rem: 4	"rem" "F" 123 ÷ 7 =	17. 4.
$456.789 \div 2.3 = 198$ rem: 1.389	456.789 ÷ 2.3 =	198.00 1.389
$74123 \div 12 = 6176$ rem: 11	"rem" "F" 74123 ÷	12. 6176. 11.
$85263 \div 12 = 7105$ rem: 3	85263 ÷	7105. 3.
$789 \div 10 = 78$ rem: 9	"rem" "F" 789 ÷ 10 =	78. 9.
$789 \div 11 = 71$ rem: 8		71. 8.

(14)

8-4 Fractional calculation

With the function mode selector at the " $a \frac{b}{c}$ " position, fractional calculations can be performed.

The display capacity as a fraction, whether entry or result, is limited to max. 3 digits for each integer, numerator or denominator part and at the same time to a max. 6 digits in the sum of each part. When an answer exceeds the above capacity, it is automatically converted to the decimal scale.

* During fractional calculations, if the independent memory keys (**M+**, **M-**) is depressed, overflow occurs.

* The decimal mode selector is also not effective in fractional calculations.

EXAMPLE	OPERATION	READ-OUT
$3 \frac{1}{4} + 2 \frac{3}{5} = 3.65$	" $a \frac{b}{c}$ " 3 F 1 F 4 + 2 F 5 =	3 F 1 F 4. 3 F 13 F 20. 3.65

Depression of the **F** key after the **=** key converts the answer in fractions to the decimal scale.

However, the decimal answer can not be re-converted to the fractional scale.

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EXAMPLE	OPERATION	READ-OUT
$3\frac{456}{78} = 8\frac{11}{13}$ (Reduction)	"a $\frac{b}{c}$ " 3 P 456 P 78 ■	3 456 78. 8 11 13.

* During a fractional calculation, a figure is reduced to the lowest terms by depressing a function command key ($\text{\textstyle \frac{a}{b}}$, $\text{\textstyle \frac{a}{b}}$, $\text{\textstyle \frac{a}{b}}$ or $\text{\textstyle \frac{a}{b}}$) or the $\text{\textstyle \frac{a}{b}}$ key if the figure is reducible as above.

$1\frac{2}{3} \times 4\frac{5}{6} \div 7\frac{8}{9}$	" $a\frac{b}{c}$ "	1 P 2 P 3 X 4 P 5 P 6 ÷ 7 P 8 P 9 =	12 P 45 = 32 P 56 =
$= 1\frac{3}{142}$		8 J 1 J 18. 1 J 3 J 142.	4 J 15. -32 J 105.

* The answer in a calculation performed between a fraction and a decimal is displayed as a decimal.

$$\frac{23}{45} \times 12.5 = 6.3888888$$

* The answer in a calculation with constant and/or percentage is also displayed as a decimal.

<u>EXAMPLE</u>	<u>OPERATION</u>	<u>READ-OUT</u>
$741 \times \frac{5}{6} = 617.49999$	" $a\frac{b}{c}$ "	5 P 6 X X 0.8333333
$963 \times \frac{5}{6} = 802.49999$	"5/4"	741 B 617.49999
75% mark-up of $\frac{789}{123} = 11.225609$	" $a\frac{b}{c}$ "	963 B 802.49999
	789 P 123 X	617.441
	75 %	4.8109756
	+	11.225609

8-5 Time calculation

With the function mode selector at the "h:m:s" position, time calculation, or calculations such as angles are performed as a decimal.

Depression of the **P** key after the **EQ** key converts the answer obtained as a decimal to the sexagesimal scale.

* During time calculations, if the independent memory key (M, C) is depressed, overflow occurs.

* The decimal mode selector is also not effective in time calculations.

EXAMPLE

OPERATION	READ-OUT
1 hour 23 minutes 45 seconds "hms" 1 2 3 P 4 5 P +	1.3958333
+ 6 hours 54 minutes 32 seconds = 8.3047222	6 5 4 P 3 2 P = 8.3047222 P 8 1 8 0 1 7.
(45° 56' - 12° 23') × 2.5 = 83° 52' 30"	"hms" 4 5 P 5 6 P - 12 P 2 3 P = P X 2 0 5 P 45.933333 33 0 33 0. 33.55 83 0 52 0 30.
145 minutes 1 hour 0 minutes 32 seconds 4 hours +) 3 hours 258 minutes 147 seconds	"hms" 0 P 1 4 5 P + 1 P 0 P 3 2 P + 4 P + 3 P 2 5 8 P 1 4 7 P 2.4166666 3.4255555 7.4255555 7.3408333 14 0 45 0 59.
14 hours 45 minutes 59 seconds	0 P

* The figure displayed on the sexagesimal scale can be re-converted to the decimal scale by depressing the function command (+, -, × or ÷) or the P key.

* When the sum of digits for hour, minute and second parts exceeds 6 digits, it displays the hour and minute parts only, dropping off the

second part on the sexagesimal scale.

However, all digits on the decimal scale remain in the register.

EXAMPLE

OPERATION	READ-OUT
	"hms"
74 hours 52 minutes 10 seconds + 48 hours 53 minutes 13 seconds = 123 hours 45 minutes 23 seconds	74 P 52 P 10 P + 48 P 53 P 13 P = 123 0 45 P - 100 P = P 23 0 45 0 23
	"hms"
25% of 2 hours 8 minutes 50 seconds 32 minutes 12.5 seconds	2 P 8 P 50 P × 25% P 0 P 32 0 12.5

* In a time calculation, when the P key is depressed to convert the answer to the sexagesimal scale, it releases the constant.

OPERATION	READ-OUT
30 minutes × 4 = 2 hours	0 P 30 P × 4 P
30 minutes × 5.7 = 2 hours 51 minutes	2 0 51 0.

8-6 Standard deviation

With the function mode selector at the "SD(σ)" position, the calculator automatically computes standard deviation (σ), arithmetical mean (\bar{x}), number of data (n), sum of square (Σx^2) and sum (Σx) by operation of Entry (data) \square and each answer is retrieved by depression of the F key and appropriate M , $M-$, MR & MC keys, symbolized for their function.

* Be sure to depress the AC key prior to starting a standard deviation function.

* Depression of the F , M , $M-$, MR or MC is not restricted to order.

EXAMPLE

OPERATION

READ-OUT

To find Standard deviation (σ), Arithmetical mean (\bar{x}), Number of data (n), Sum of square (Σx^2) and sum (Σx) based on the data: 55, 54, 51, 55, 53, 53, 54, 52.

"SD(σ)" "F"

AC 55 \square 54 \square 51 \square

55 \square 53 \square 54 \square 52 \square

(σ)	F	52.
(\bar{x})	\bar{x}	1.4078859
(n)	M	53.375
(Σx^2)	MR	8.
(Σx)	MC	22805.
		427.

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- * To enter a data as a negative figure, operate Data \square \square in sequence.
- * To correct the data after depressing the \square key, depress the C key successively and re-enter the data correctly.

EXAMPLE

OPERATION

READ-OUT

To find Standard deviation and arithmetical mean based on the data: 1.2, -0.9, -1.5, 2.7, -0.6.

"SD(σ)" "F"

AC 1 \square 2 \square 9 \square \square

1 \square 5 \square 2 \square 7 \square

(mistake) 1 \square 6 \square \square

(To correct) C

\square 6 \square \square

-1.6

-1.6

-0.6

5.

0.18

1.7311845

Note: The calculator computes the standard deviation (σ) based on the formula:

$$\sigma = \sqrt{\frac{\Sigma x^2 - (\Sigma x)^2 / n}{n - 1}}$$

If the S.D. is required on the formula in the above example, operate as follows.

$$\sqrt{\frac{\Sigma x^2 - (\Sigma x)^2 / n}{n}}$$

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EXAMPLE**OPERATION****READ-OUT**

"SD(σ)" "F"
 1 5 2 7 6 5
 P x 4 5 (n-1)(n)
 "√" P 1.5484185

9/APPLICATIONS**PRO-RATING**

Division	Sales amount	%
A	\$ 3,375	25
B	\$ 4,320	32
C	\$ 5,805	43
Total	\$13,500	100

OPERATION**READ-OUT**

"GT" "F"
 3375+4320+5805= 13500.
 100= 25.
 4320= 32.
 5805= 43.
 P 100.

INVOICING

Article	Q'ty	Unit price	Amount
A	150	\$ 6.50	\$ 975
B	70	14.25	997.5
C	480	55.00	26,400
Total	700		\$28,372.5
6% sales tax			\$ 1,702.35
Grand total			\$30,074.85

OPERATION**READ-OUT****"GT" "F"**

AC MC 150= 975.
 70= 997.5
 480= 26400.
 P 700.
 MR 28372.5
 x 6% 1702.35
 + 30074.85

10/SPECIFICATIONS

Operations:

Four basic functions, chain & mixed operations, multiplication/division with a constant, squares & powers, reciprocals, percentage calculations including mark-up/discounts, square roots, automatic accumulation in four functions, direct access to the memory, division obtaining the remainder, fractional calculations, time calculations, angle calculations, statistical calculations including standard deviation, and various kinds of practical calculations.

Capacity:

Entry 8 digits
Four basic functions 8 digits
Square root 8 digits
Accumulation into the memory 8 digits
Fractional calculation Max. 3 digits
[for each integer, numerator or denominator] and at the same time
Max. a 6 digits for the sum of each part.

Decimal point: Full floating or fixed with cut-off or round-off at 2 decimal place.

Negative number: Indicated by minus (—) sign on the left of the figure.

Overflow check: Indicated by the "E." sign, locking the calculator.

Read-out: Zero suppression, Digitron tube panel.

Main component: One chip LSI.

Power consumption: 0.2 W

Power source:

AC 100, 117, 220 or 240V ($\pm 10\%$), 50/60Hz, with applicable AC Adaptor.

DC Two AA size manganese dry batteries (SUM-3) operate about 10 hours continuously.

Two AA size alkaline dry batteries (AM-3) operate about 20 hours continuously.

Usable temperature: 0°C ~ 40°C (32°F ~ 104°F)

Dimensions: 25 mm H x 82 mm W x 140 mm D
(1" H x 3-3/8" W x 5-5/8" D)

Weight: 175 g (6 oz) including batteries.